

REMARKS

Claims 1 to 21 and 23 to 24 are now pending in the application. Claim 11 is amended and Claim 22 is cancelled, and the subject matter incorporated into amended Claims 1 and 16. Claims 1 and 16 are further amended to recite the phrase: "wherein at least one of said hydrophobic layer or said hydrophilic layer is variable as applied across the gas diffusion medium." Support for these amendments is found in the specification as originally filed, for example at paragraph [0046] and original Claims 5 to 8. Claim 14 is amended to correct a typographical error.

The Examiner is respectfully requested to reconsider the claims and withdraw the rejections in view of the amendments and remarks contained herein.

CLAIM OBJECTIONS

Claim 14 stands objected to because of a typographical error. The original claim recited a "water flow channel to *delivery* water". Applicants thank the Examiner for bringing the typographical error to Applicants' attention, and have amended Claim 14 appropriately.

REJECTION UNDER 35 U.S.C. § 103 OVER NELSON ET AL. IN VIEW OF OUVRY ET AL.

Claims 1 to 3, 10, and 15 to 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Pat. No. 6,150,049) in view of Ouvry et al. (U.S. Pat. No. 6,444,347). This rejection is respectfully traversed.

Applicants have amended Claims 1 and 16 to include limitations not described by the combined Nelson and Ouvry references. The Examiner states in the Office Action

that the combined references fail to teach variability of hydrophobicity and hydrophilicity in the cross-plane and in-plane direction of the hydrophobic and hydrophilic layers. Office Action at page 4. The Examiner also stated that the combined references fail to teach a capillary element in the MEA to allow water to pass through the hydrophobic layer into the inner parts of the gas diffusion layer. Office Action at page 5. The amended claims now recite both variability of hydrophobicity and hydrophilicity across the gas diffusion medium and a capillary element in the MEA.

Accordingly, the presently amended claims are patentable over the combined Nelson and Ouvry references.

REJECTION UNDER 35 U.S.C. § 103 OVER NELSON ET AL. AND OUVRY ET AL. IN VIEW OF

IMAHASHI ET AL.

Claims 4 to 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. and Ouvry et al. in view of Imahashi et al. (U.S. Pat. No. 5,350,643). This rejection is respectfully traversed.

The combined references of Nelson, Ouvry and Imahashi do not describe all the limitations of the presently amended claims. Amended Claim 1, upon which Claims 4 to 9 depend, recites “at least one capillary element extending through said hydrophobic layer and terminating in said hydrophilic layer”. The combined Nelson and Ouvry references do not describe a capillary element in the MEA. The Imahashi reference also fails to describe a capillary element. Therefore, the combined references do not describe all the limitations of Claims 4 to 9.

Applicants further submit that the Imahashi reference does not describe a hydrophobic layer that is variable as applied across the gas diffusion medium. Rather, the Imahashi reference describes a MEA where “the water repellency of the portion in the catalyst layer of the oxygen electrode facing to the electrolyte membrane is lower than the water repellency of the portion in the catalyst layer of the hydrogen electrode facing to the electrolyte membrane.” Imahashi at col. 3, lines 20-25. “Important is that the water repellency of the hydrogen electrode is higher than that of the oxygen electrode.” Imahashi at col. 4, lines 7-8. “According to the present invention, wettability of the catalyst layer in the hydrogen electrode is controlled by making higher the water repellency of the hydrogen electrode than that of the oxygen electrode, to thereby eliminate the excess water from the catalyst layer of the hydrogen electrode.” Imahashi at col. 5, lines 40-45. The Imahashi reference thus describes variation in water repellency between different gas diffusion electrodes existing on either side of the PEM.

In contrast, the amended Claim 1 recites variability “as applied across the gas diffusion medium.” “The amount of hydrophilic and hydrophobic agents applied, and with that the hydrophobicity/hydrophilicity, is not even across the diffusion media (in-plane and cross-plane). With this in mind, in specific applications, a desired distribution can be achieved.” Specification at paragraph [0046]. Therefore, the claimed variation in hydrophobicity/hydrophilicity is within the diffusion medium, and not variation between different gas diffusion electrodes as described by the reference.

Furthermore, the concentration gradient cited at Example 2 of Imahashi is only in the thickness direction of the catalyst later, i.e the in-plane direction. See Imahashi at col. 7, lines 37-65. The Imahashi reference does not disclose cross-plane variation in

hydrophobicity/hydrophilicity across a gas diffusion medium, and does not describe variability across the gas diffusion medium as claimed. Therefore, Imahashi does not provide the elements lacking in the combined Nelson and Ouvry references.

For at least these further reasons, the amended claims are non-obvious over the combined Nelson, Ouvry and Imahashi references.

REJECTION UNDER 35 U.S.C. § 103 OVER NELSON ET AL. AND OUVRY ET AL. IN VIEW OF GASCOYNE ET AL.

Claims 11 to 14 and 22 to 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. and Ouvry et al. in view of Gascoyne et al. (U.S. Pub. No. 2003/0031909). This rejection is respectfully traversed.

As established in the above arguments, the combined Nelson and Ouvry references do not describe a hydrophobic or hydrophilic layer that is variable as applied across the gas diffusion medium. In other words, the references do not describe variability of hydrophobicity and hydrophilicity in the cross-plane and in-plane directions of the hydrophobic or hydrophilic layers.

The Gascoyne reference does not describe a hydrophobic/hydrophilic layer that is variable as applied across the gas diffusion medium. Therefore, the Gascoyne reference does not provide the limitations found lacking in the combined Nelson and Ouvry references.

Accordingly, Claims 11 to 14 and 22 to 24 are patentable over the Nelson and Ouvry references in view of the Gascoyne reference.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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